

Abstract Submitted
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Drop Size and Velocity Distributions of the Spray of Aerated Liquid Injection in Gaseous Crossflow KHALED SALLAM, ADEGBOYEGA ADEBAYO, Oklahoma State University — In this study an experimental investigation of the drop size and velocity distributions of the spray of an aerated liquid injection in subsonic crossflow is described. The test conditions for this study include injector exit diameter of 1 mm, crossflow Mach number of 0.3, momentum flux ratio of 5, and gas-to-liquid mass ratio of 8%. Double pulsed digital holography was used to investigate the spray characteristics at downstream distances of 50, and 100 jet diameter. The holograms are reconstructed into “slices” and analyzed using image-processing algorithms to yield information about the drop sizes and drop velocities. Four different drop size distributions are tested: the normal distribution, the Rosin-Rammler distribution, the log normal distribution, and the Simmons’ universal root-normal distribution. It was found that the log normal distribution best quantified the data obtained in this study. The drop streamwise and cross stream velocities at downstream distances of 50 jet diameter were found to be still evolving. The crossflow drop velocities converged to almost uniform velocity at a distance of 100 jet diameters downstream from the injector exit.

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